Data visualization explorations around the Home

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Introduction

H.Om.E project aims to create bridges between cultures from South America and Asia, exploring the potential of the encounter between technologies and traditions, methodologies, and scale. This paper briefly describes the conceptual framework and some developments made by María José Ríos and Ricardo Vega, artists from Chile. We freely explore the possibilities of computational and technologically mediated tools in their encounter with traditions and crafts. We explored different kinds of pieces, such as data physicalization in textiles, generative design for visual pattern creation based on legal texts, among others.

Origin and Motivation

The first stage of H.Om.E project has its roots in three previous creative experiences that served as an inspiration for the current project.: Tribe Against Machine (Taiwan; 2017, 2018), The Mind of a Greenhouse and Tashi Gatsen Charity School (Tibet, 2018), and the I_C Project (Chile, 2021-22). The last one, I_C Project, was developed in 2022 in Chile by the artist María José Ríos, exploring intersections of wearable technology and textiles, emphasizing the transformative potential of merging indigenous clothing culture with new technologies.
For the current project, María José Rios and Ricardo Vega, are Chilean artists, designers, and programmers, using data ranging from astronomy, DNA sequences, and political text, among others, to mainly explore different ways for visual representation. For this stage, we create initial visual proposals for discussion. Some results of the mentioned explorations, the process involved, and some of the main concepts involved are shown here.

Conceptual framework on Explorations in Data Visualization

Traditionally, data is visualized functionally and analytically (bars, dot plots, etc), but for this project, we plan to diverge from it. Instead of analytical analysis, we are focused on explorations of subjectivity, individual expression, and aesthetic motivations to create data-based visual experiences.
The images created are based on data from two primary sources, astronomical data (stars, galaxies, exoplanets..) and text related to social issues (the Chilean constitution). For the astronomical data, the conceptual linkage is based on the idea that “the celestial realm represents our ultimate shared environment, encompassing all living and nonliving elements” (Vega et al, 2024). Conversely, constitutional texts serve as “the foundation for societal rules and norms, a kind of common home for societies” (Vega et al, 2024).
From these conceptual approaches using astronomical data and legal text, we started to create explorations on data visualization and drawing generation.

Concepts and Explorations of María José

For this project, her approach mixes traditional textile techniques with modern technology, exploring data and information systems. Through the integration of new digital technologies for visualizing astronomical data, she explores wearables and textiles as mediums for visualization and connection, a kind of new skin capable of connecting us beyond the limits of the body.
The data used in this specific project are related to solar system planets, its mons, and an abstraction of its chemical composition, this is mainly due to color restriction in the looming machine. To produce que pieces, a Norwegian mechanical-digital loom was used for weaving astronomical data into tangible forms. The result are two pieces of woven surfaces, measuring 70 cm x 90 cm each, translating complex data into tactile and visually captivating artworks.

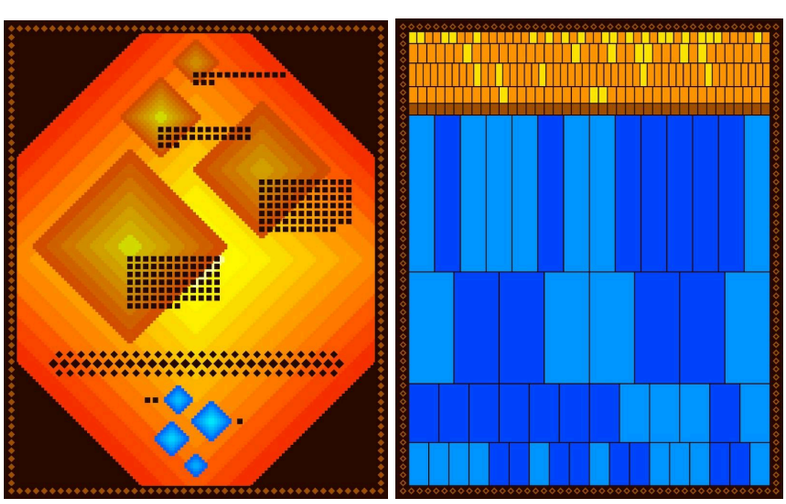


Fig. 1-2. The two original programmed images, based on data from solar system data, from I_C Project.

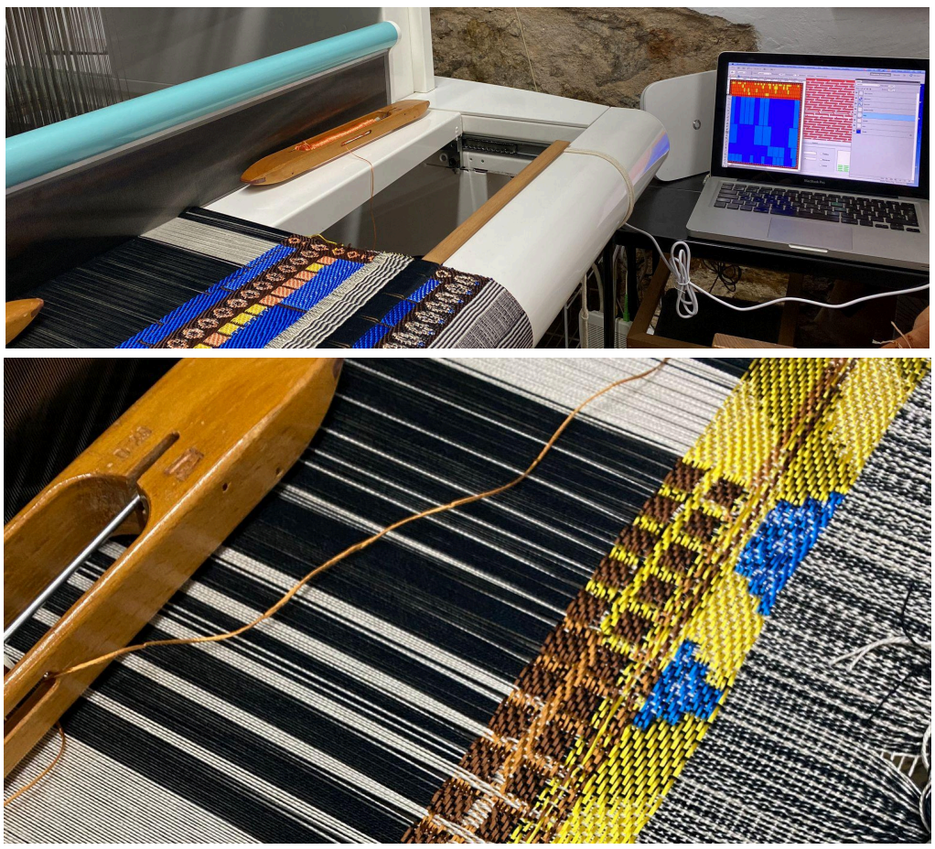


Fig. 3-4. Images from weaving process from I_C Project, astronomy data being woven into textiles with, prototype photo from Barcelona.

In this project, María José reaffirms herself as a Chilean pioneer of efforts to merge heritage craftsmanship with modern data visualization methodologies. In this project imbuing textiles with astronomical data, she not only expands the boundaries of artistic expression, allowing us to remember the deeper connections among us and our place in the cosmos.

Concepts and Explorations of Ricardo

Some inspiration for the project is based on historical references such as Quipús, known for their mobile structure and textile-based data representation, and Felipe Guaman Poma's illustrated chronicles, used during XVI and XVII centuries to give news of the new world to the Spanish king. For those historical to the research framework, we worked with some Chilean professionals, like the anthropologist and linguists.
In the contemporary environment, the dissolution of the individual is evident in the face of vast amounts of data characterized by its massiveness, speed, and abstraction (Manovich, 2002). Data is presented in visualizations as functional and analytical representations, oriented to an efficient comprehension of data features. For this I want to explore different representations of data, exploring alternative forms of expression.
The main data source for the visual explorations is the Chilean constitution., a document that reflects the societal framework that establishes common rules for coexistence, a kind of textual home. Also, this text has a symbolic significance, particularly in light of recent events in his home country, Chile.
By this, the text of the Chilean constitution serves as a foundation for creating drawings, in a simple process of mapping letters to movement.

Fig. 5. Images from Felipe Guaman Poma's illustrated chronicles, an important inspiration for the project.

Process & Algorithm

To create drawings, some articles of the constitution were selected to explore the potential of the output. Following the description of the process, which had four main parts: data acquisition; data explorations; algorithm definition; and visual mapping.
a) data acquisition: the text data is preprocessed and structured in a proper format to be latter used.
b) data explorations: with the formatted data, some initial explorations were made to understand the nature of the contents. Some visualizations are made to understand, for example, some common words and distribution of words, among others. Programmed in Python.
c) algorithm definition: a set of simple rules are defined by assigning letters (vowels) as parameters to assign color to elements such as dots and/or lines.
d) visual mapping: by using simple software written in the Processing program environment, data text is read by each article in the constitution. For each vowel found in each word, the algorithm works and draws a point accordingly.

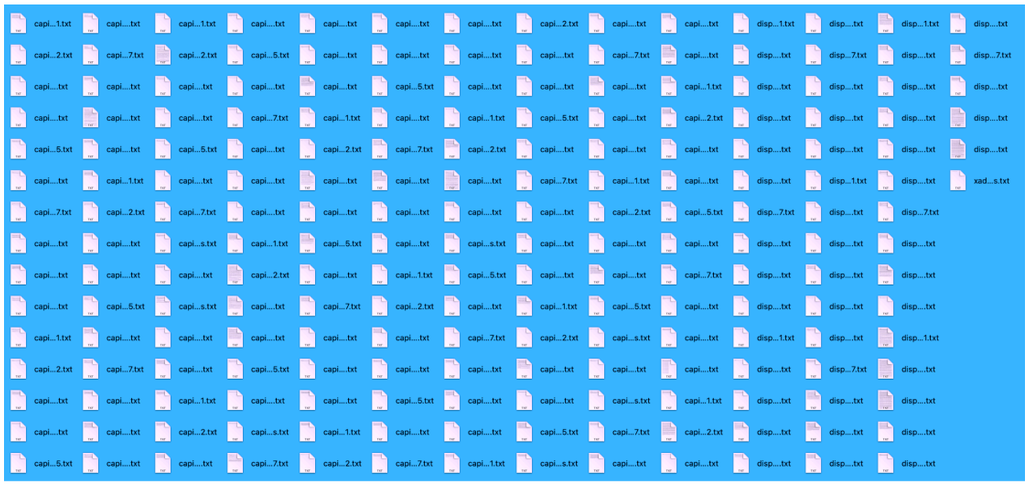
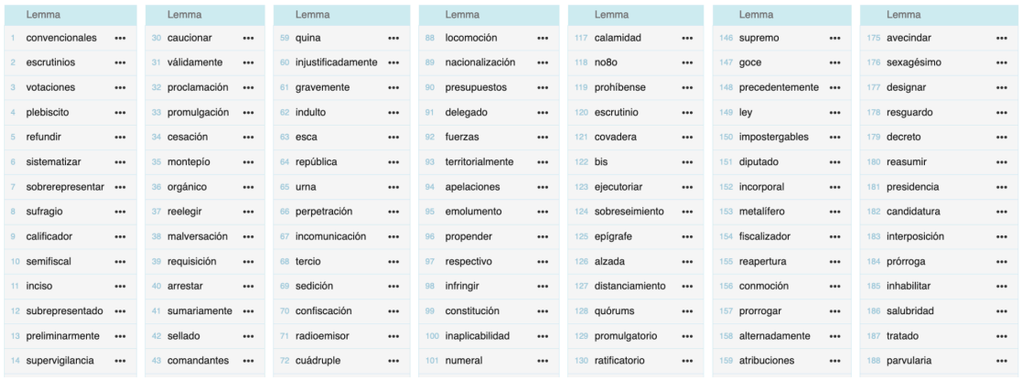


Fig. 6. Images from the files of the different articles processed of the chilean constitution, 150 in total.



	Lemma		Lemma		Lemma		Lemma		Lemma		Lemma
1	convencionales	30	caucionar	59	quina	88	locomoción	117	calamidad	146	supremo	175	avecindar
2	escrutinios	31	válidamente	60	injustificadamente	89	nacionalización	118	no8o	147	goce	176	sexagésimo
3	votaciones	32	proclamación	61	gravemente	90	presupuestos	119	prohíbense	148	precedentemente	177	designar
4	plebiscito	33	promulgación	62	indulto	91	delegado	120	escrutinio	149	ley	178	resguardo
5	refundir	34	cesación	63	esca	92	fuerzas	121	covadera	150	impostergables	179	decreto
6	sistematizar	35	montepío	64	república	93	territorialmente	122	bis	151	diputado	180	reasumir
7	sobrerepresentar	36	orgánico	65	urna	94	apelaciones	123	ejecutoriar	152	incorporal	181	presidencia
8	sufragio	37	reelegir	66	perpetración	95	emolumento	124	sobreseimiento	153	metalífero	182	candidatura
9	calificador	38	malversación	67	incomunicación	96	propender	125	epígrafe	154	fiscalizador	183	interposición
10	semifiscal	39	requisición	68	tercio	97	respectivo	126	alzada	155	reapertura	184	prórroga
11	inciso	40	arrestar	69	sedición	98	infringir	127	distanciamiento	156	conmoción	185	inhabilitar
12	subrepresentado	41	sumariamente	70	confiscación	99	constitución	128	quórums	157	prorrogar	186	salubridad
13	preliminarmente	42	sellado	71	radioemisor	100	inaplicabilidad	129	promulgatorio	158	alternadamente	187	tratado
14	supervigilancia	45	comandantes	72	cuádruple	101	numeral	130	ratificatorio	159	atribuciones	188	parvularia

Fig. 7. Images from initial explorations of the Chilean constitution, here some word count examples.

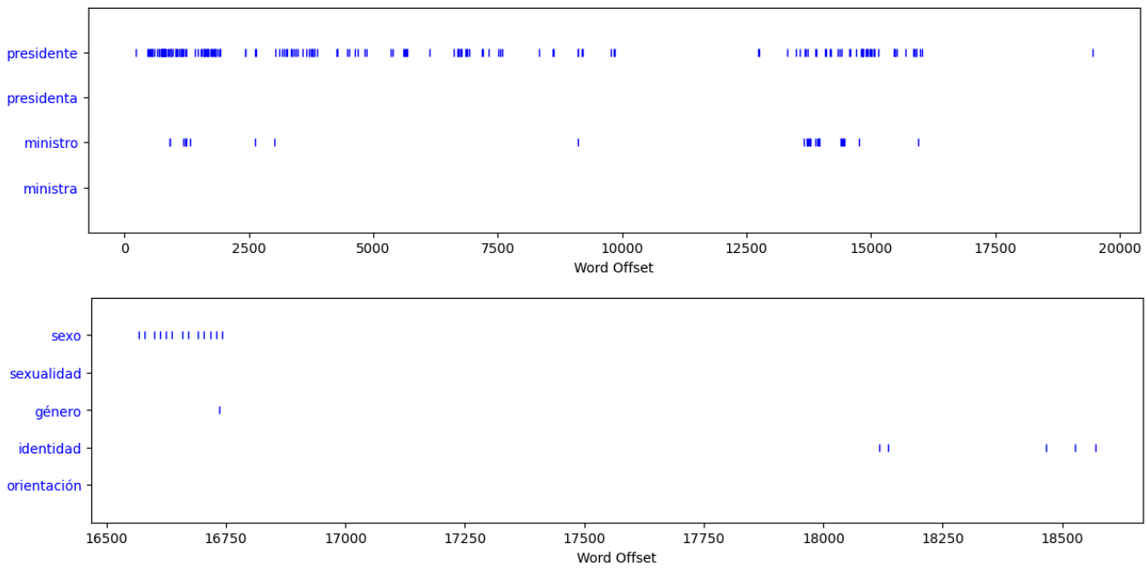


Fig. 8. Images from initial explorations of the Chilean constitution, here some lexical distribution of some selected words.

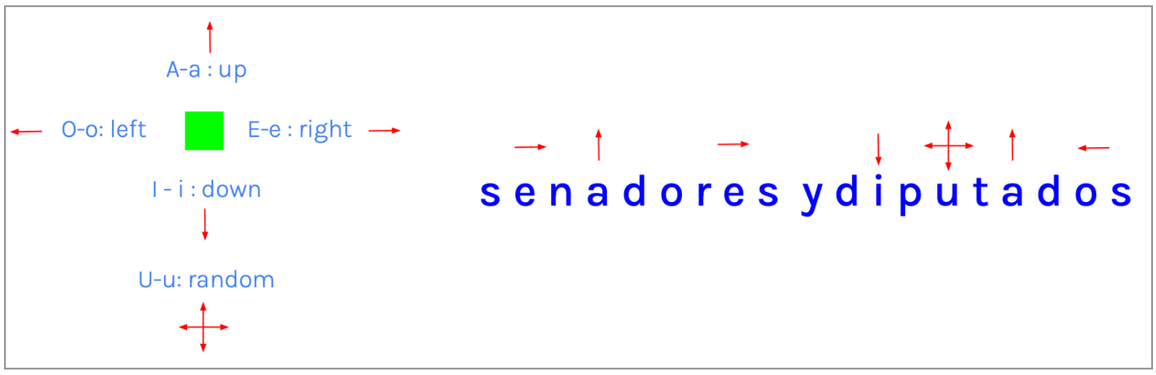


Fig. 9. Images from the drawing algorithm by changing position of points depending on the vowel found.

As a next step, the process described above is planned to be implemented using the illustrated chronicles of Felipe Guaman Poma (1534-1615, Peru), which provide a rich source of inspiration for visual explorations. This is a way to incorporate the original perspective into the project, making a comparison between different texts from distinct epochs, minds, and cultural frameworks, allowing us to understand differences in how we live and consider our societies.

Output Images

The result of the process is a set of different generative drawings is obtained, yielding unexpected and visually compelling images. Some examples of the images are shown here.

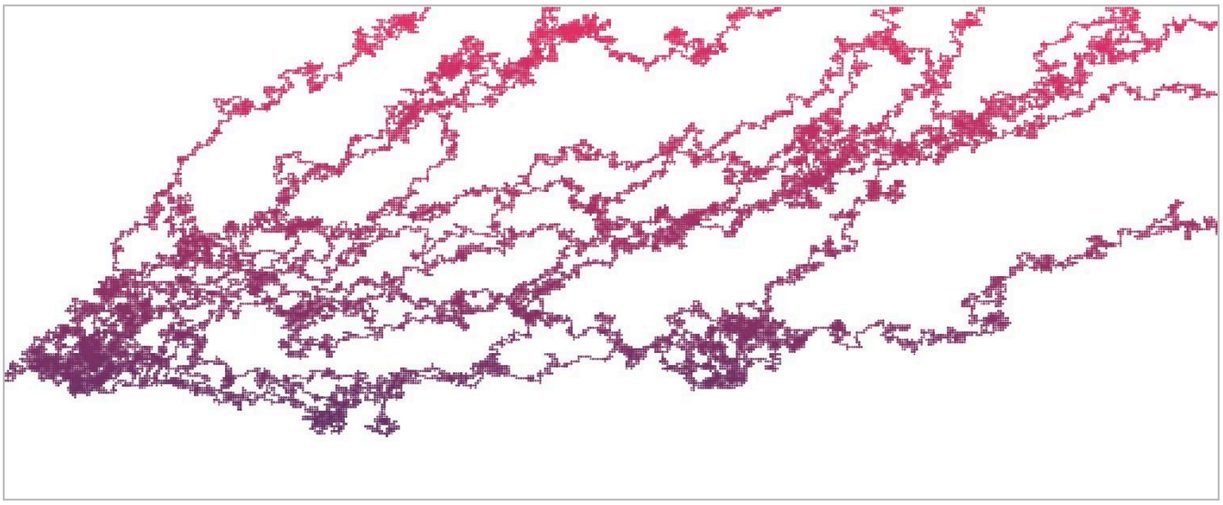
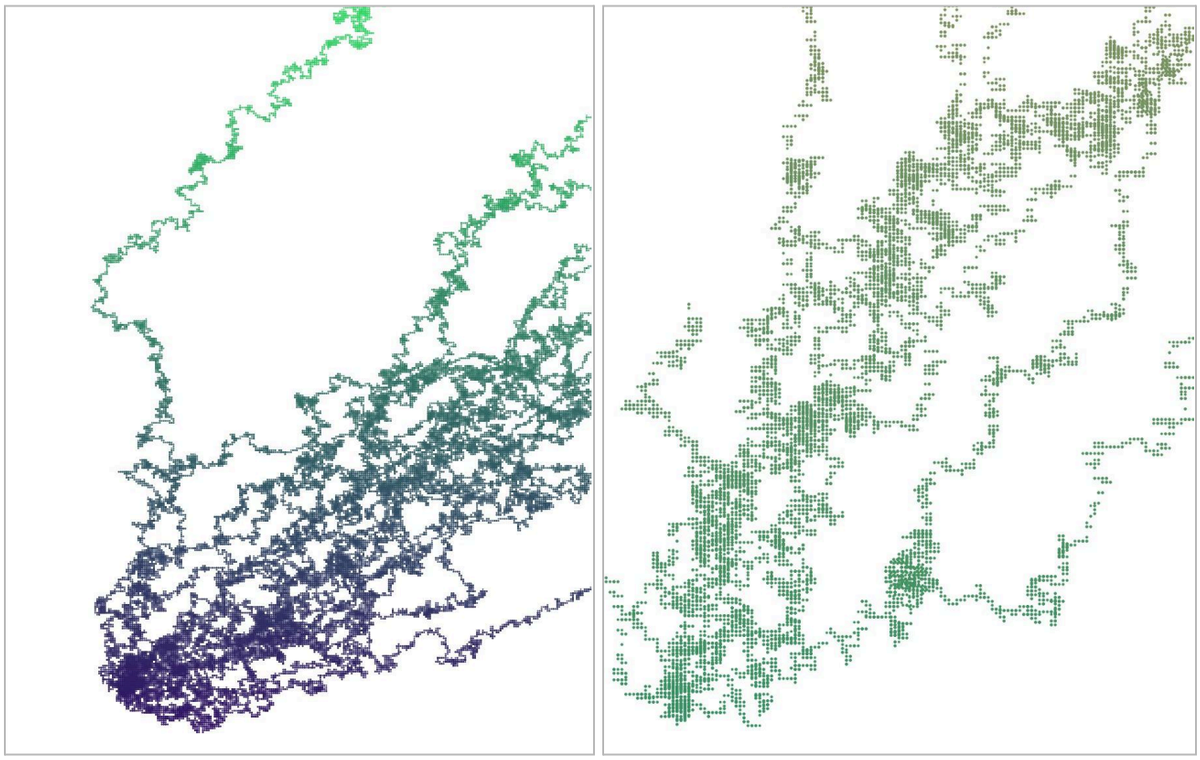


Fig. 10. Initial test with the constitution article as input for image generation.



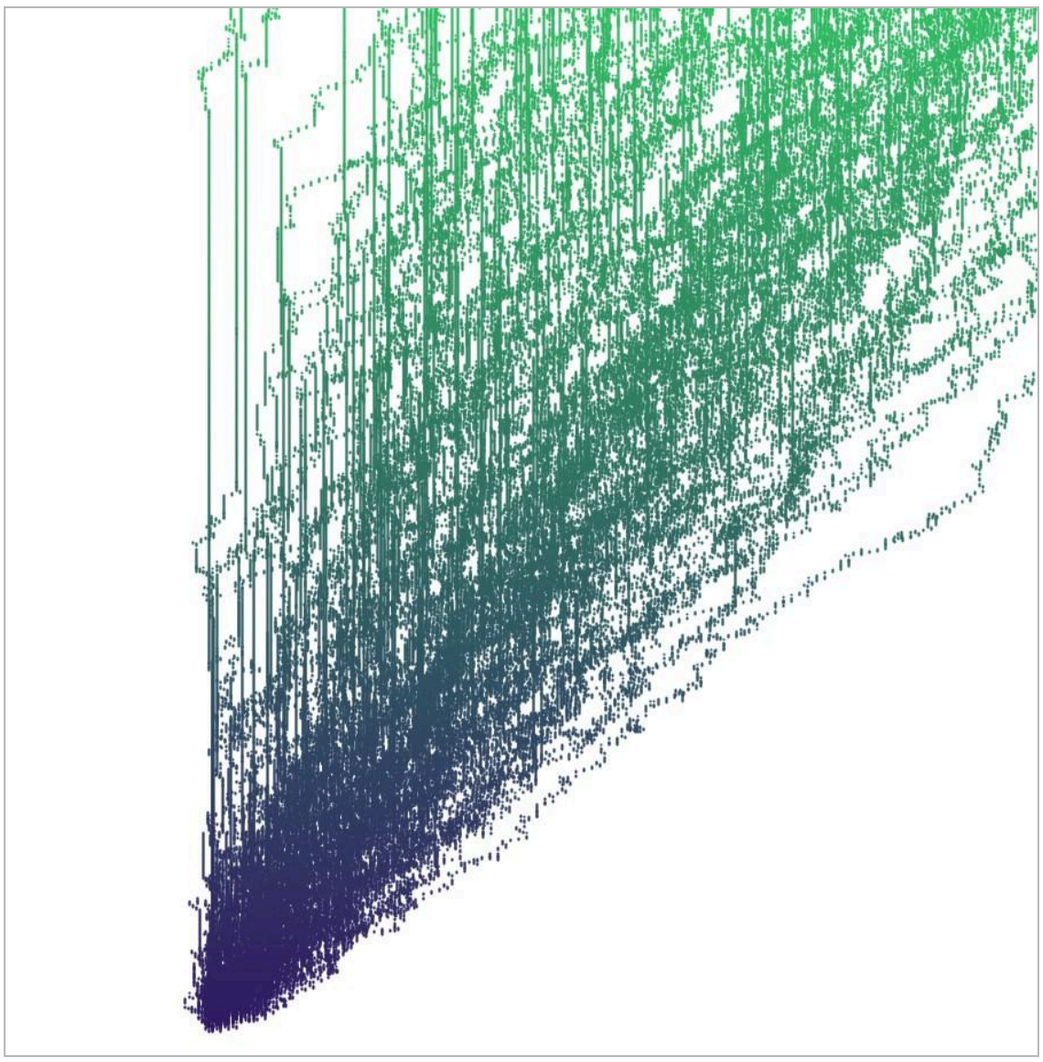
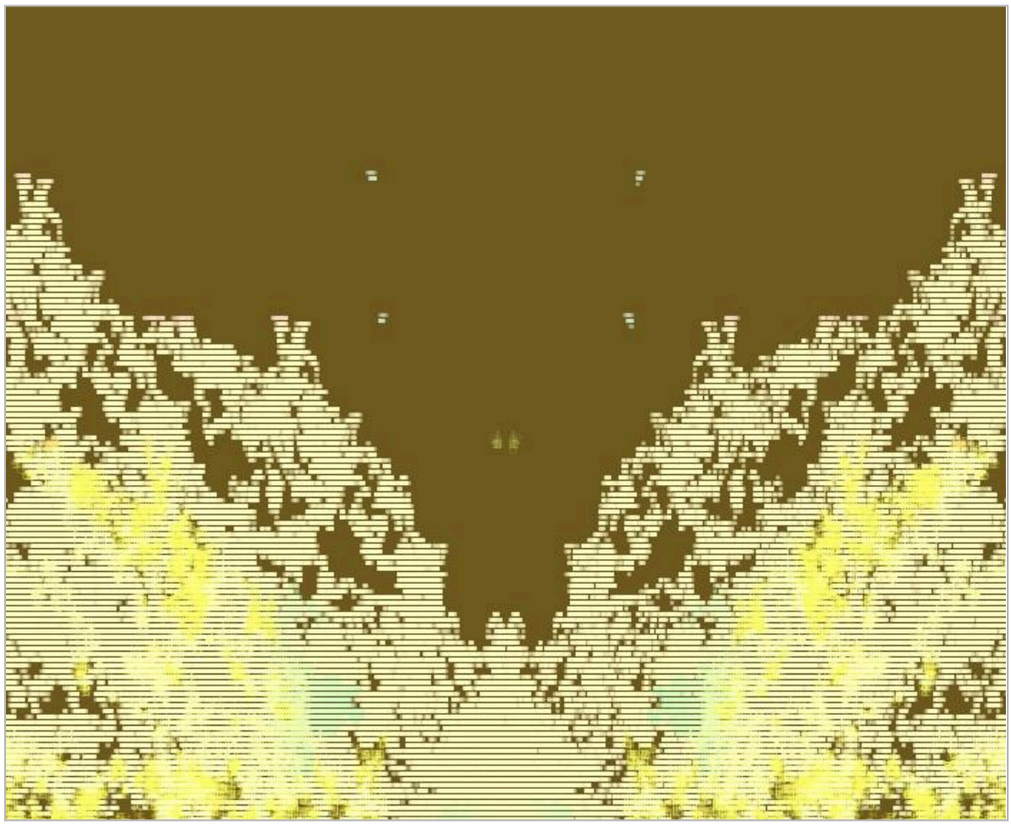
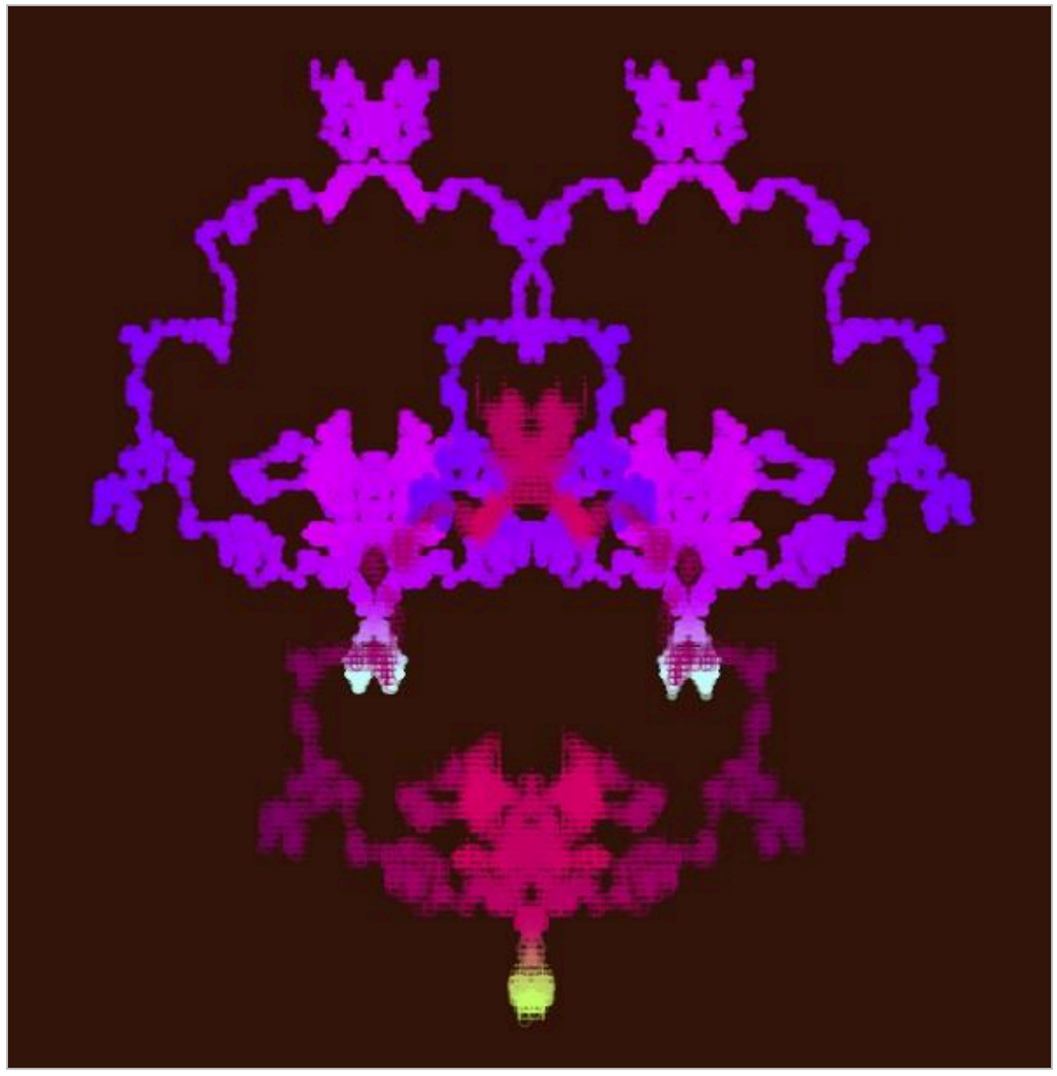


Fig. 11-12-13. Continuation of drawing using the constitutional articles data. Depending on the letter detected, the position of a new point is drawn. Distance between points can also be modified, changing the density in the image. Made in Processing and Python.





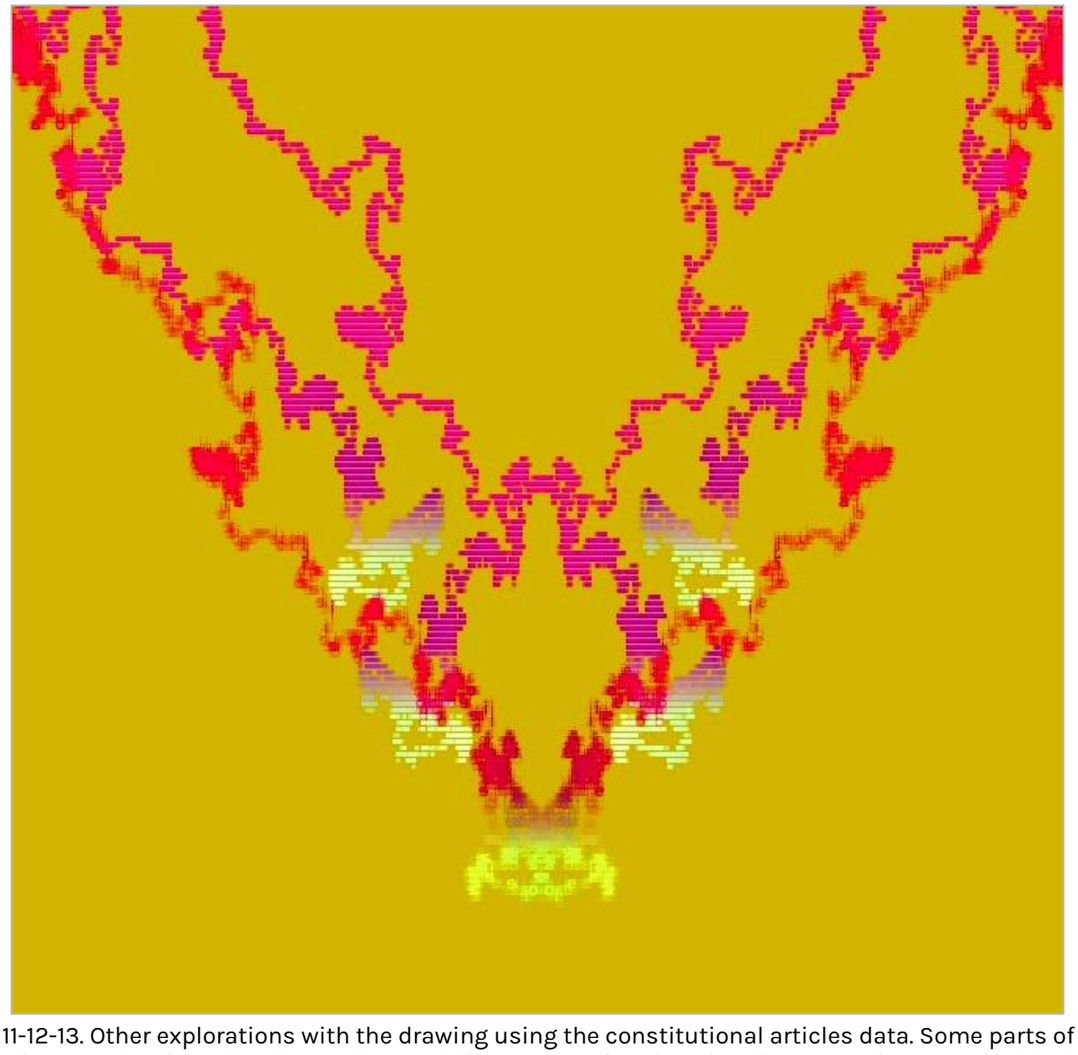


Fig. 11-12-13. Other explorations with the drawing using the constitutional articles data. Some parts of the drawings are duplicated and turned around, like a mirror forming visually suggestive patterns. Made in Processing and Python.

Final thoughts

The current outcomes of the present stage include diverse artworks related to data physicalization and generative design, re-contextualizing data into the art context. For us as Chilean artists, it was a great challenge not just in the idea of creating artworks, but in the process of sharing points of view about the world, and concepts of artistic creation itself.
The generative process explored here is simple, as simple are the rules of many phenomena in nature, where the richness of the interactions is where the complexity arises, exceeding aesthetic expectations, defined by a deterministic simple set of rules.
Our proposals for the project shown here seeks to expand traditional data visualization methods, giving focus to subjective expression in the process of transforming data into images. This is also a starting point for new aesthetic exploration in the future.

Acknowledgements

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References

Chieh, S., Ríos, M., Sugihara, S., Vega, R. H.Om.E Project: An intercultural dialog between Computers and traditions around the concepts of Home. xCoAx 2024, 12th Conference on Computation, Communication, Aesthetics & X Treviso, Italy.